

WHAT IS CLAIMED IS:

1. An electric-component holding apparatus comprising:

a component holder which holds an electric component and which includes an engaging portion;

a holder-holding member to which the component holder is detachably attached;

a lock member which consists of a substantially rigid body, and which is supported by the holder-holding member such that the lock member is movable relative to the holder-holding member, and is engaged with the engaging portion of the component holder to lock the component holder to the holder-holding member; and

a locked-state maintaining device which includes an operable member and an elastic member and which maintains, owing to an elastic force of the elastic member, a locked state in which the lock member is engaged with the engaging portion of the component holder,

wherein the locked-state maintaining device does not allow, when a force is exerted to the component holder in a direction to cause the component holder to move away from the holder-holding member, the force to be exerted to the lock member in a direction to increase an amount of elastic deformation of the elastic member, and allows, when an operating force is applied to the operable member in the direction to increase the amount of elastic deformation of the elastic

member, the lock member to be disengaged from the engaging portion of the component holder and unlocked from the locked state.

2. An apparatus according to claim 1, wherein the component holder comprises a suction nozzle which applies a negative pressure to the electric component and thereby holds the component.

3. An apparatus according to claim 1, wherein the component holder comprises a plurality of holding jaws which cooperate with each other to hold the electric component.

4. An apparatus according to claim 1, wherein the holder-holding member comprises a cylindrical portion which has an inner fitting hole and additionally has a through-hole radially formed therethrough to open, at an inner one of opposite open ends thereof, in the inner fitting hole, and the component holder comprises a fitting shank which is fitable in the inner fitting hole of the holder-holding member and which has an engaging recess as the engaging portion of the component holder, wherein the lock member is held in the through-hole of the cylindrical portion such that the lock member is movable in the through-hole in an axial direction of the through-hole parallel to an axis line thereof and is substantially immovable in a direction perpendicular to the axial direction, and the lock member has a dimension which assures that the lock member can

simultaneously project out of both the opposite open ends of the through-hole, and wherein the locked-state maintaining device comprises (a) a sleeve which moveably fits on an outer circumferential surface of the cylindrical portion of the holder-holding member, and is movable to an operative position thereof in which the sleeve faces the through-hole and keeps the lock member engaged with the engaging recess of the component holder, and to a retracted position thereof in which the sleeve allows the lock member to be disengaged from the engaging recess, (b) the elastic member which biases the sleeve to the operative position thereof, and (c) the operable member which receives the operating force to move the sleeve to the retracted position thereof against the elastic force of the elastic member.

5. An apparatus according to claim 4, wherein the lock member comprises a ball which has a diameter greater than a length of the through-hole.

6. An apparatus according to claim 4, wherein the operable member is integral with the sleeve.

7. An apparatus according to claim 1, wherein the holder-holding member has a fitting hole and additionally has a holding hole which crosses the fitting hole while partly overlapping, in space, the fitting hole, and the component holder comprises a fitting shank which is fitable in the fitting hole of the holder-holding member and which has an engaging recess as the

engaging portion of the component holder, wherein the lock member comprises a lock bar which is held in the holding hole of the holder-holding member such that the lock bar is movable in the holding hole in an axial direction of the holding hole parallel to an axis line thereof, and is substantially immovable in a direction perpendicular to the axial direction, and the lock bar is movable to an operative position thereof in which the lock bar is engaged with the engaging recess of the component holder, and to a retracted position thereof in which the lock bar is disengaged from the engaging recess, and wherein the locked-state maintaining device comprises (a) the elastic member which biases the lock bar to the operative position thereof, and (b) the operable member which receives the operating force to move the lock bar to the retracted position thereof against the elastic force of the elastic member.

8. An apparatus according to claim 7, wherein the lock bar comprises a lock pin which has a circular transverse cross section.

9. An apparatus according to claim 7, wherein the operable member is integral with the lock bar.

10. An apparatus according to claim 1, wherein the holder-holding member comprises one of a fitting hole and a fitting shank fitable in the fitting hole, and the component holder comprises the other of the fitting hole and the fitting shank,

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wherein the lock member comprises a lock lever which is supported by the holder-holding member such that the lock lever is pivotable, about an axis line perpendicular to a common line of the fitting hole and the fitting shank, to an operative position thereof in which the lock lever is engaged with the engaging portion of the component holder to prevent the component holder from moving away from the holder-holding member, and to a retracted position thereof in which the lock lever is disengaged from the engaging portion, and wherein the locked-state maintaining device comprises (a) the elastic member which biases the lock lever to the operative position thereof, and (b) the operable member which receives the operating force to move the lock lever to the retracted position thereof against the elastic force of the elastic member.

11. An apparatus according to claim 10, wherein the operable member is integral with the lock lever.

12. An apparatus according to claim 4, wherein the fitting hole comprises a tapered hole having an inner tapered surface, and wherein the fitting shank comprises a tapered shank having an outer tapered surface which is fitable in the inner tapered surface of the tapered hole.

13. An electric-component holding apparatus comprising:

a holder-holding member;

two moving members which is supported by the holder-holding member such that the two moving members are movable toward, and away from, each other;

two holding jaws which are attached to the two moving members, respectively, and cooperate with each other to hold an electric component;

two attaching devices which attach the two holding jaws to the two moving members, respectively; and

a drive device which moves the two moving members toward, and away from, each other,

wherein each one of the two attaching devices comprises

(a) a fitting recess and a fitting projection fitable in the fitting recess, one of the fitting recess and the fitting projection of said each one of the two attaching devices being provided by a corresponding one of the two moving members, the other of the fitting recess and the fitting projection of said each one of the two attaching devices being provided by a corresponding one of the two holding jaws, and

(b) a lock device which is normally held in a locked state thereof in which the lock device prevents the fitting recess and the fitting projection of said each one of the two attaching devices from moving away from each other and is unlocked from the locked state thereof by a special movement of at least one of the two moving members over a predetermined range of distance therebetween.

14. An apparatus according to claim 13, wherein the fitting recess of said each one of the two attaching devices comprises a fitting hole which is formed in said one of the two moving members, and the fitting projection of said each one of the two attaching devices comprises a fitting shank which is fitable in the fitting hole and which is provided by said one of the two holding jaws, and wherein the lock device of said each one of the two attaching devices comprises

an engaging recess which is formed in the fitting shank provided by said one of the two holding jaws,

a holding hole which is formed in said one of the two moving members such that the holding hole crosses the fitting hole while partly overlapping, in space, the fitting hole,

a lock bar which is held in the holding hole such that the lock bar is movable in the holding hole in an axial direction of the holding hole parallel to an axis line thereof, and which is movable to an operative position thereof in which the lock bar is engaged with the engaging recess of the fitting shank to prevent the fitting shank from moving away from the fitting hole, and to a retracted position thereof in which the lock bar is disengaged from the engaging recess to allow the fitting shank from moving away from the fitting hole,

an elastic member which biases the lock bar to the operative position thereof, and

an operating member which moves, based on the special movement of said at least one of the two moving members, the lock bar to the retracted position thereof against an elastic

force of the elastic member.

15. An apparatus according to claim 14, wherein the operating member of the lock device of said each one of the two attaching devices moves, based on a special approaching movement of said at least one of the two moving members toward the other moving member over a lower limit of the predetermined range of distance therebetween, the lock bar to the retracted position thereof against the elastic force of the elastic member.

16. An apparatus according to claim 15, wherein the operating member of the lock device of said each one of the two attaching devices comprises an integral portion of the other of the two moving members than said one moving member holding the lock bar moved by the operating member.